BISMILLAH PAK FORCES COACHING & EDUCATIONAL ACADEMY

Student Name _____ Father Name _____ Roll Number _____

Class: 2nd /Year - Mathematics Marks : 120 Exam Format : 786-Test Session 21-22 , Recite 3 times Darood o Salam Before Starting Test

Time : bismillahacademy223@gmail.com | Date _____ Examiner Sig _____ Chapter#: 1

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) If $f(x) = \frac{1}{x+3}$, then domain of f^{-1} is

a) R - {-3}	b) R - {-1}	c) R - {0}	d) R - {1}

2) If $f(x) = 2 + \sqrt{x-1}$, then range of $f^{-1}(x)$ is

a) $[2, +\infty)$	b) $(1, +\infty)$	c) $(-\infty, 2)$	d) $[1, +\infty)$

3) A function in which the variable appears as exponent is called:

a) Logarithmic function	b) Rotational function	c) Exponential function	d) Constant function

4) If $f(x) = \frac{x-1}{x+1}$, then $f(x)$ is

a) Odd function	b) Even function	c) Neither even nor odd function	d) Both a and b

5) Range of $f(x) = \frac{x}{x^2-4}$ is

a) R = {-2, 2}	b) R - {0}	c) R - {4}	d) R

6) The graph of $\frac{x^2}{4} + \frac{y^2}{9} = 1$ is symmetrical about

a) x - axis	b) y - axis	c) Origin	d) Both axes and origin

7) The graph of $y^2 = 4ax$ is symmetric about

a) y = axis	b) x - axis	c) Both axes	d) Origin

8) A function f from X to Y is denoted by

a) $f: X \to X$	b) $f: Y \to X$	c) $f: Y \to Y$	d) $f: X \to Y$

9) If $f(x) = \sqrt{x+4}$, then $f(x^2 + 4)$

a) $\sqrt{x^2+4}x$	b) $\sqrt{x^2+8}$	c) $\sqrt{x^2+8}$	d) x

10) If $f(x) = \sqrt{x^2-4}$, then domain of f is

a) $(-\infty, -2] \cup [2, +\infty)$	b) $(-\infty, +\infty)$	c) $[-2, 2]$	d) $[-3, 3]$

11) If $f(y) = y^3 + y^2 + y + 1$, then $f(0)$=

a) -1	b) 1	c) 2	d) 3

12) Domain and range of a liner functions are

a) Natural numbers	b) Whole numbers	c) Integers	d) Set of real numbers

13) If f: $f: X \to Y$ then set X is called

a) Domain	b) Range	c) Dependent variable	d) Co-domain

14) Domain of a constant function is

a) R	b) Q	c) N	d) W

15) Implicit relation is symbolically written as

a) y = f(x)	b) f(x, y) = 0	c) x = f(t), y = g(t)	d) y = f(u), u = g(x)

16) A function f is said to be even if

a) $f(x) - f(x) = 0$	b) $f(x) = f(x)^2$	c) $f(x) = -f(x)$	d) $f(-x) = f(x) \forall x \epsilon D_f$

17) $\frac{e^x + e^{-x}}{e^x - e^{-x}} =$

a) tanhx	b) cothx	c) sechx	d) coshx

18) If $x = a^y$, then $y = \log_a x, a > 0, a \neq 1$ is called

a) Logarithmic function	b) Exponential function	c) Hyperbolic function	d) Trigonometric function

19) Domain of $f(x) = x^2$ is

a) $(-\infty, 0]$	b) $[0, \infty)$	c) R	d) (0, 1]

20) The function of $f(x) = \frac{2+3x}{x}$ is not continuous at

a) $x = -\frac{2}{3}$	b) x = 0	c) x = 1	d) x = 2

2 Answer the following short questions (2 x 25 = 50)

i) Given that (a) f(x) = x^2 - x: (b) f(x) = $\sqrt{x+4}$ Find f (x - 1)

ii) Find $\frac{f(a+h)-f(a)}{h}$ and simplify where. f(x) = sin x

iii) Find $\frac{f(a+h)-f(a)}{h}$ and simplify where. f(x) = cos x

iv) Show that the parametric equations: x = a cos θ, y = b sin θ represent the equation of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

v) Determine whether the given function f is even or odd. f(x) = x^3 + x

vi) The real valued function f and g are defined below. Find fof (x)
f(x) = 2x + 1 ; g(x) = $\frac{3}{x-1}$, x ≠ 1

vii) The real valued function f and g are defined below. Find gog (x)
f(x) = 2x + 1 ; g(x) = $\frac{3}{x-1}$, x ≠ 1

viii) The real valued function f and g are defined below. Find gof (x)
f(x) = $\sqrt{x+1}$; g(x) = $\frac{1}{x^2}$, x ≠ 0

ix) The real valued function f and g are defined below. Find fof (x)
f(x) = $\frac{1}{\sqrt{x-1}}$, x ≠ 1 ; g(x) = $(x^2+1)^2$

x) Evaluate each limit using theorems of limits $\lim_{x\to 1}(3x^2-2x+4)$

xi) Evaluate each limit using theorems of limits $\lim_{x\to 3}\sqrt{x^2+x+4}$

xii) Evaluate each limit using theorems of limits $\lim_{x\to -2}\frac{2x^3+5x}{3x-2}$

xiii) Evaluate each limit using algebraic techniques. $\lim_{x\to 2}\frac{x^3-8}{x^2-x-6}$

xiv) Evaluate each limit using algebraic techniques. $\lim_{x\to 4}\frac{2x^2-32}{x^3-4x^2}$

xv) Evaluate each limit using algebraic techniques. $\lim_{h\to 0}\frac{\sqrt{x+h}-\sqrt{x}}{h}$

xvi) Evaluate each limit using algebraic techniques. $\lim_{x\to a}\frac{x^n-a^n}{x^m-a^m}$

xvii) Evaluate the following limits: $\lim_{\theta\to 0}\frac{1-\cos\theta}{\sin\theta}$

xviii) Evaluate the following limits: $\lim_{x\to \pi}\frac{\sin x}{\pi-x}$

xix) Express each limit in term s of e. $\lim_{n\to\infty}\left(1+\frac{1}{3n}\right)^n$

xx) Express each limit in term s of e. $\lim_{x\to 0}(1+2x^2)^{\frac{1}{x^2}}$

xxi) Graph the curves that has the parametric equations given below:
x = t, $y = t^2$, $-3 \le t \le 3$ where "t" is a parameter.

xxii) Find the graphical solution of the following equations: $\frac{x}{2}$ = cos x

xxiii) Let $f(x) = \sqrt{x^2-9}$. Find the domain and range of f.

xxiv) Express each limit in term of " e " . $\lim_{n\to\infty}\left(1-\frac{1}{n}\right)^n$

xxv) Evaluate each limit by using algebraic techniques . $\lim_{n\to\infty}\frac{x^n-a^n}{x^m-a^m}$

3 Answer the Following Long Questions (5 x 10 = 50)

i) For the real valued functions, f defined below, find
(a) f^{-1} (x) (b) f^{-1} (-1) and verify f(f^{-1} (x)) = f^{-1}(f(x)) = x
(i) f(x) = -2x + 8
(ii) f(x) = $3x^3$ + 7

ii) Evaluate the following limits: $\lim_{\theta\to 0}\frac{1-\cos p\theta}{1-\cos q\theta}$

iii) Determine the left hand limit and right hand limit and then find limits of the following functions at x = c: f(x) = $2x^2$ + x - 5, c = 1

iv) If f(x) = $\begin{cases} 3x \text{ if } x \le -2 \\ x^2-1 \text{ if } -2 < x < 2 \\ 3 \text{ if } x \ge 2 \end{cases}$ Discuss continuity at x = 2 and x = -2

v) If f(x) = $\begin{cases} x+2 & x \le -1 \\ c+2 & x > -1 \end{cases}$, find "c" so that $\lim_{x\to -1} f(x)$ exist.

vi) Find the values of m and n, so that given function f is continuous. f(x) = $\begin{cases} mx \text{ if } x < 3 \\ x^2 \text{ if } x \ge 3 \end{cases}$

vii) Find the domain and range of the function defined by $f(x) = \begin{cases} x & when\ 0 \le x \le 1 \\ x-1 & when\ 1 < x \le 2 \end{cases}$ Also draw its graph .

viii) Find the domain and the range of the function g defined below , and sketch of graph of g .
$g(x) = \begin{cases} 6x+7 & ,x \le -2 \\ 4-3 & ,-2 < x \end{cases}$

ix) Evaluate . $\lim_{n\to+\infty}\frac{x^4-10x^2+1}{-3x^3+10x^2+50}$

x) Discuss the continuity of f at 3 , when $f(x) = \begin{cases} x-1 & ,if\ x < 3 \\ 2x+1 & ,if\ 3 \le x \end{cases}$

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MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) $\lim_{\delta x \to o} \frac{f(0+\delta x) - f(0)}{\delta x}$

a) $f(a)$	b) $f'(0)$	c) $f'(x)$	d) $f(\delta x)$

2) $f(x) = e^x(1+\ln x)$ then $f'(x)$

a) $\frac{e^x}{x}$	b) $\frac{e^x}{x} + (1+\ln x)\, e^x$	c) $-\frac{e^x}{x}$	d) $e^x \ln x + \frac{1}{x}$

3) If f(x) = tan x, then $f'(0)$ =

a) zero	b) ∞	c) 1	d) -1

4) Taylor Series Expansion is only valid if it is

a) Divergent	b) Convergent	c) Both a & b	d) Alternating

5) Differentiating sinx w.r.t cotx we get

a) $\cos^2 x \sin x$	b) $-\sin^2 x \cos x$	c) $\sin^2 x \cos x$	d) $-\cos^2 x \sin x$

6) If $y = \tan^2 x$, then $\frac{dy}{dx}$ =

a) 2tanx $\sec^2 x$	b) tanx $\sec^2 x$	c) $\tan^2 x \sec^2 x$	d) 2 tan x sec x

7) The notation Df(x) is used for derivative by

a) Leibniz	b) Newton	c) Lagrange	d) Cauchy

8) $\frac{d}{dx}(\sinh x)$ =

a) cosh x	b) - cosh x	c) csch x	d) - sinh x

9) If $y = \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2$ then $\frac{dy}{dx}$ =

a) $\frac{x^2-1}{x^2}$	b) (x^2+1)	c) $\frac{x^2+1}{x}$	d) $\frac{x-1}{x^2}$

10) The minimum value of $f(x)$ = $x^2 - x - 2$ is

a) $-\frac{4}{9}$	b) $\frac{9}{4}$	c) $-\frac{9}{4}$	d) $\frac{4}{9}$

11) If $y = e^{x^2+1}$ then $\frac{dy}{dx}$ =

a) e^{x^2+1}	b) $e^{x^2+1}.(2x)$	c) $\frac{e^{x^2+1}}{2x}$	d) e^{x^2}

12) If $x = 1 - t^2$ and $y = 3t^2 - 2t^3$ then $\frac{dy}{dx}$ =

a) - 3 (t + 1)	b) 3 (t - 1)	c) -3 (t - 1)	d) 3 (t + 1)

13) $\frac{d}{dx}\left(\sin^{-1}\left(\frac{a}{x}\right)\right)$ =

a) $\frac{-1}{x\sqrt{x^2-a^2}}$	b) $\frac{-a}{x\sqrt{x^2-a^2}}$	c) $\frac{a}{x\sqrt{a^2-x^2}}$	d) $\frac{1}{\sqrt{x^2-a^2}}$

14) If f(x) = sinx, then $f^n(\pi) =$

a) ∞	b) -1	c) 1	d) zero

15) $\frac{d}{dx}\left(\frac{e^x + e^{-x}}{2}\right)$ =

a) coshx	b) sinhx	c) -sinhx	d) sechx

16) If c ϵ Df and $f'(c) = 0$ or $f'(c)$ does not exist then the number c is called

a) Absolute value	b) Extreme value	c) Critical value	d) none

17) If $f(x)$ = ln (1 + x) then by Maclaurin Series $f(x)$ =

a) $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots\ldots$	b) $1 + 2x + \frac{4x^2}{2!} + \frac{8x^3}{3!} + \ldots\ldots$	c) $1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \ldots\ldots$	d) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots$

18) If y = ln x, then $\frac{dy}{dx}$ =

a) $\frac{\ln x}{x}$	b) $\frac{1}{x}$	c) $a^{\ln x}$	d) None

19) If y = $\sinh^{-1}$x, then $\frac{dy}{dx}$ =

a) $\frac{1}{\sqrt{1+x^2}}$	b) $\frac{1}{\sqrt{1-x^2}}$	c) $-\frac{1}{\sqrt{1-x^2}}$	d) $-\frac{1}{\sqrt{1+x^2}}$

20) If y = f(x) and x = g(y) are inverse of each other, then f(g(y)) =

a) y	b) x	c) x/y	d) xy

Subjective Type

2 Answer the following short questions (2 x 25 = 50)

i) Find by definition the derivatives w.r.t. 'x' of the functions defined as: $\frac{1}{x^3}$

ii) Find by definition the derivatives w.r.t. 'x' of the functions defined as: x^{40}

iii) Differentiate w.r.t. 'x' $\sqrt{\frac{a-x}{a+x}}$

iv) Differentiate w.r.t. 'x' $\frac{\sqrt{x^2+1}}{\sqrt{x^2-1}}$

v) Differentiate: $(1 + x^2)^n$ w.r.t. x^2

vi) Differentiate w.r.t. 'x' $\text{Sec}^{-1}\left(\frac{x^2+1}{x^2-1}\right)$

vii) Find $f'(x)$ if $f(x) = e^{\sqrt{x}-1}$

viii) Find $f'(x)$ if f(x) = $\frac{e^x}{e^{-x}+1}$

ix) Find $f'(x)$ if $f(x) = \frac{e^{ax}-e^{-ax}}{e^{ax}+e^{-ax}}$

x) Find $f'(x)$ if $f(x) = \ln\left(\sqrt{e^{2x}+e^{-2x}}\right)$

xi) Find y_2 if $y = 2x^5 - 3x^4 + 4x^3 + x - 2$ .....(1)

xii) Find y_2 if $y = \sqrt{x} + \frac{1}{\sqrt{x}}$

xiii) Find y_2 if x = a cos θ, y = a sin θ

xiv) Find y_2 if $x^2 + y^2 + 2gx + 2fy + c = 0$ .....(1)

xv) Find the extreme values for the following function defined as $f(x) = 1 - x^3$

xvi) Find the extreme values for the following function defined as $f(x) = 3x^2 - 4x + 5$

xvii) Find the extreme values for the following function defined as $f(x) = 5 + 3x - x^3$

xviii) Divide 20 into two parts so that sum of their squares will be minimum.

xix) Find the derivative of $x^3 + 2x + 3$.

xx) Find $\frac{dy}{dx}$ if $x = at^2$ and $y = 2at$.

xxi) Find $\frac{dy}{dx}$ if $y = \ln\left(x + \sqrt{x^2+1}\right)$

xxii) Find $\frac{dy}{dx}$ if $y = e^{-x}(x^3 + 2x^2 + 1)$

xxiii) Find $\frac{dy}{dx}$ if $y = 5\,e^{3x-4}$

xxiv) Find $\frac{dy}{dx}$ if $y = (x+1)^x$

xxv) If $y = \sin^{-1}\frac{x}{a}$, then show that $y_2 = x\,(a^2 - x^2)^{-\frac{3}{2}}$

3 Answer the Following Long Questions (5 x 10 = 50)

i) Differentiate w.r.t. 'x' $\frac{(1+\sqrt{x})(x-x^{\frac{3}{2}})}{\sqrt{x}}$

ii) Differentiate the trigonometric functions from first principles. $\cos x^2$

iii) Differentiate $\sin^2 x$ w.r.t. $\cos^4 x$

iv) If x = Sin θ y = sin mθ Show that $(1 - x^2)\,y_2 - xy_1 + m^2y = 0$

v) If $y = e^{ax}$ sin bx show that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + (a^2+b^2)\,y = 0$

vi) Apply the Maclaurin expansion to prove that $\sqrt{1+x} = 1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{16} + \ldots\ldots$

vii) A box with a square base and open top is to have a volume of 4 cubic dm . Find the dimensions of the box which will require the least material ?

viii) Differentiate $\frac{(\sqrt{x}+1)\left(x^{3/2}-1\right)}{x^{3/2}-x^{1/2}}$ with respect to x .

ix) Differentiate $\frac{2x^3-3x^2+5}{x^2+1}$ with respect to x .

x) Find $\frac{dy}{dx}$ if $y = x^2 ln\frac{1}{x}$

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Chapter#: 3

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) $\int \frac{dx}{\sqrt{x^2-a^2}} =$

a) $\cosh^{-1}\left(\frac{x}{a}\right)+c$	b) $\sinh^{-1}\left(\frac{x}{a}\right)+c$	c) $\ln(x+\sqrt{x^2-a^2})+c$	d) both a & b

2) $\int (2x+3)^4 dx =$

a) $\frac{(2x+3)^5}{5}+c$	b) $\frac{(2x+3)^5}{10}+c$	c) $\frac{(2x+3)^5}{2}+c$	d) $\frac{4(2x+3)^3}{10}+c$

3) $\int \sqrt{a^2-x^2}\,dx =$

a) $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\cos^{-1}\left(\frac{x}{a}\right)+c$	b) $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\mathrm{Sin}^{-1}\left(\frac{x}{a}\right)+c$	c) $\frac{x}{2}\sqrt{a^2+x^2}-\frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)+c$	d) $\frac{x}{2}\sqrt{a^2+x^2}+\frac{a^2}{2}\cos^{-1}\left(\frac{x}{a}\right)+c$

4) $\int \sqrt{2x+3}(2dx) =?$

a) $\frac{2}{3}(2x+3)^{\frac{3}{2}}+c$	b) $\frac{3}{2}(2x+1)^{\frac{3}{2}}+c$	c) $-\frac{2}{3}(2x+1)^{\frac{3}{2}}+c$	d) $-\frac{3}{2}(2x+1)^{\frac{3}{2}}+c$

5) $\int (e^x+\sec^2 x)dx =$

a) $(e^x+secx)+c$	b) $(e^x+\tan x)+c$	c) $e^x+\tan x+c$	d) $e^x+\sec x+c$

6) $\int e^{\sin x}\cos x\ dx =$

a) $\frac{e^{\sin x}}{\cos x}+c$	b) $\sin x\ e^{\sin x-1}+c$	c) $e^{\sin x}+c$	d) $\ln(e^{\sin x})+c$

7) If the length of each edge of a changes from 5 to 5.02 then approximate increase in the volume is

a) 1.5 cubic units	b) 1.7 cubic units	c) 2 cubic units	d) 0.5 cubic units

8) A suitable substitution for $\sqrt{a^2+x^2}$ is

a) x = asec θ	b) x = a tan θ	c) x = a sin θ	d) All

9) $\int \frac{\sec^2 x}{\tan x}\,dx$

a) $\frac{\sec^3 x}{3}+c$	b) $\ln\lvert\tan x\rvert+c$	c) $\ln\lvert\cot x\rvert+c$	d) $\ln\lvert\sec^2 x\rvert+c$

10) $\int \frac{1}{\sqrt{1-x^2}}dx =?$

a) $\sin^{-1}$ x + c	b) - $\sin^{1-}$ x+c	c) - $\cos^{-1}$ x + c	d) $\cos^{-1}$ x + c

11) The solution of $\frac{dy}{dx}$ = cos x is

a) y = cos x + c	b) x − y = c	c) y = sin x + c	d) None of these

12) $\int_a^b f(x)dx =$

a) $-\int_a^b f(x)dx$	b) $\int_b^a f(x)dx$	c) $-\int_b^a f(x)dx$	d) All

13) $\int \frac{\cos x}{\sin x \ln \sin x} dx =$

a) $\ln(\sin x) + c$	b) $\ln(\ln \cos x) + c$	c) $\ln(\ln \sin x) + c$	d) $\ln(\cos x) + c$

14) The solution of differential equation $\frac{d}{dx} = -y$ is

a) $y = e^{-x}$	b) $y = ce^{-x}$	c) $y = ce^{x}$ dx	d) $y = e^{x}$

15) $\int \sqrt{x^2 - a^2}\ dx =$

a) $\frac{x}{2}\sqrt{x^2-a^2}+\frac{a^2}{2}\ln\lvert x+\sqrt{x^2-a^2}\rvert+c$	b) $\frac{x}{2}\sqrt{x^2-a^2}-\frac{a^2}{2}\ln\lvert x+\sqrt{x^2-a^2}\rvert+c$	c) $\frac{x}{2}\sqrt{x^2-a^2}-\frac{a^2}{2}\ln\lvert x-\sqrt{x^2-a^2}\rvert+c$	d) none

16) The order of differential equation $2x^2y\frac{dy}{dx} = x^2 - 1$ is

a) 1	b) 2	c) 3	d) 4

17) If $\int_0^1 (4x + k)dx = 2$ then k =

a) zero	b) 2	c) 1	d) 4

18) $\int_{-1}^{2} (x + |x|)dx = ?$

a) 1	b) 2	c) 4	d) 8

19) $\int_0^{\frac{\pi}{3}} \sin 2x\ dx =$

a) $\frac{3}{4}$	b) $\frac{4}{3}$	c) 1	d) All are incorrect

20) $\int \sec^2(ax + b)dx =$

a) $\tan(ax + b) + c$	b) $\frac{\cos(ax+b)}{a} + c$	c) $\frac{\tan(ax+b)}{a} + c$	d) $\frac{\cot(ax+b)}{a} + c$

Subjective Type

2 Answer the following short questions (2 x 25 = 50)

i) Find δy and dy in the case: $y = x^2 - 1$ when x changes from 3 to 3.2

ii) Find δy and dy in the case: $y = x^2 + 2x$ when x changes from 2 to 1.8

iii) Find δy and dy in the case: $y = \sqrt{x}$ when x changes from 4 to 4.41

iv) Using differentials, find $\frac{dy}{dx}$ and $\frac{dx}{dy}$ in the equations. xy + x = 4

v) Using differentials, find $\frac{dy}{dx}$ and $\frac{dx}{dy}$ in the equations. $x^2 + 2y^2 = 16$

vi) Evaluate the indefinite integrals.

$\int x(\sqrt{x}+1)dx \quad (x > 0)$

vii) Evaluate the indefinite integrals.

$\int \frac{\sqrt{y}\,(y+1)}{y}\,dy \qquad (x > 0)$

viii) Evaluate: $\int \frac{ax+b}{ax^2+2bx+c}\,dx$

ix) Evaluate the integrals by parts. $\int x^4\,\ell n\,x\,dx$

x) Evaluate the integrals by parts. $\int x^3\,cos\,x\,dx$

xi) Evaluate the integrals by parts. $\int e^x \sin x \cos x\,dx$

xii) Evaluate the integrals by parts. $\int x \sin x \cos x\,dx$

xiii) Evaluate the integrals by parts. $\int x\,cos^2\,x\,dx$

xiv) Evaluate the integrals:

$\int tan^3\,x \sec x\,dx = \int tan^2 x\,(\tan x \sec x)\,dx$

xv) Evaluate the indefinite

$\int \frac{2x}{1-\sin x}\,dx = \int \frac{2x}{1-\cos(\frac{\pi}{2}-x)}\,dx \left(\because \cos\left(\frac{\pi}{2}-x\right) = \sin x\right)$

xvi) Evaluate the definite integrals. $\int_{-1}^{1} (x^{1/3}+1)dx$

xvii) Evaluate the definite integrals. $\int_{1}^{2} \ell n\,x\,dx$

xviii) Evaluate the definite integrals. $\int_{0}^{2} (e^{\frac{x}{2}} - e^{-\frac{x}{2}})\,dx$

xix) Evaluate the definite integrals. $\int_{0}^{\pi/4} \frac{1}{1+\sin x}\,dx$

xx) Use differentials to approximate the value of 29^0

xxi) Evaluate . $\int x\sqrt{x^2-1}\,dx$

xxii) Evaluate . $\int \frac{1}{\sqrt{x}(\sqrt{x}+1)}\,dx\,,(x>0)$

xxiii) Evaluate . $\int x^2 . a\,e^{ax}\,dx$

xxiv) Find the area bounded by the curve $y = 4 - x^2$ and the x-axis.

xxv) Solve . $\sec x + \tan y \frac{dy}{dx} = 0$

3 Answer the Following Long Questions (5 x 10 = 50)

i) Evaluate the indefinite $\int e^{ax}\left[a\,\text{Sec}^{-1}x + \frac{1}{x\sqrt{x^2-1}}\right]dx$

ii) Evaluate the indefinite. $\int \frac{3x+1}{x^2-x-6}\,dx$

iii) Evaluate the indefinite. $\int \frac{x+4}{x^3-3x^2+4}\,dx$

iv) Evaluate the indefinite. $\int \frac{12}{x^3+8}\,dx$

v) Evaluate the indefinite. $\int \frac{4x+1}{(x^2+4)(x^2+4x+5)}\,dx$

vi) Evaluate the indefinite. $\int_{0}^{\frac{\pi}{4}} cos^4\,t\,d\,t = \int_{0}^{\frac{\pi}{4}} \frac{1}{4}(4\,cos^4\,t)dt$

vii) Evaluate the indefinite. $\int_{\pi/6}^{\pi/2} \frac{\cos x}{\sin x\,(2+\sin x)}\,dx$

viii) Find the area below the curve $y = 3.\sqrt{x}$ and above the x-axis between x = 1 and x = 4.

ix) Determine the area bounded by the parabola $y = x^2 + 2x - 3$ and x-axis.

x) Cheek that equations written against the differential equation is its solution. $\frac{dy}{dx} = \frac{y^2+1}{e^{-x}}$, $y = \tan(e^x + c)$

BISMILLAH PAK FORCES COACHING & EDUCATIONAL ACADEMY

Student Name _____ Father Name _____ Roll Number _____

Class: 2nd /Year - Mathematics Marks : 120 Exam Format : 786-Test Session 21-22 , Recite 3 times Darood o Salam Before Starting Test

Time : bismillahacademy223@gmail.com | Date _____ Examiner Sig _____

Chapter#: 4

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) The perpendicular distance from the point (2, 1) to the line 3x + 4y + 5 = 0 is

a) 10	b) 3	c) $\frac{4}{3}$	d) $\frac{3}{5}$

2) The line represented by $ax^2 + 2hxy + by^2 = 0$ will be real and coincident if

a) h^2 ? ab	b) $h^2 < ab$	c) $h^2 = ab$	d) none

3) If m_1 and m_2 are slopes of Perpendicular lines then

a) $m_1 = m_2$	b) $m_1m_2 = -1$	c) $m_1m_2 = 1$	d) $m_1 \neq m_2$

4) Angles of line passing through (5, 11) and is (−2, 4) with x − axis

a) 45°	b) 135°	c) 90°	d) 225°

5) ax + by + c = 0 shows a straight line with slope

a) $-\frac{a}{b}$	b) $-\frac{b}{a}$	c) $\frac{a}{b}$	d) $\frac{b}{a}$

6) Two intercepts form of 2x − 4y + 11 = 0 is

a) $y = \frac{x}{2} + \frac{11}{4}$	b) $\frac{x}{\frac{11}{2}} + \frac{y}{\frac{11}{4}} = 1$	c) $\frac{x}{\frac{-11}{2}} + \frac{y}{\frac{11}{4}} = 1$	d) $y = 2x + \frac{11}{4}$

7) The midpoint of the line segment joining the points $A\left(-\sqrt{5}, -\frac{1}{3}\right), B\left(-3\sqrt{5}, 5\right)$ is

a) $\left(-2\sqrt{5}, \frac{14}{3}\right)$	b) $\left(-4\sqrt{5}, \frac{14}{3}\right)$	c) $\left(2\sqrt{5}, \frac{7}{3}\right)$	d) $\left(-2\sqrt{5}, \frac{7}{3}\right)$

8) A joint equation of y = 2x = 0 and y − 3x = 0 is

a) $y^2 - xy - 6x^2 = 0$	b) $6y^2 - xy - x^2 = 0$	c) $x^2 + xy + 6y^2 = 0$	d) $6x^2 + xy + y^2 = 0$

9) Equation of line with x − intercept: −3 and y − intercept: 4 is

a) 4x − y + 36 = 0	b) 4x + y − 36 = 0	c) 4x − 3y + 12 = 0	d) 2y − 3x = 5

10) The shortest distance between the lines 12x + 5y − 6 = 0 and 12x + 5y + 12 = 0 is

a) $\frac{7}{13}$	b) $\frac{19}{13}$	c) $\frac{5}{\sqrt{8}}$	d) $\frac{10}{19}$

11) Equation of y − axis is

a) y = 0	b) x = 0	c) y = a	d) x = a

12) For b > 0 the point p (x_1, y_1) lies below the lin ax + by + x = 0 if

a) $ax_1 + by_1 + c > 0$	b) $ax_1 + by_1 + c < 0$	c) $ax_1 + by_1 + c = 0$	d) $ax_1 + by_1 + c \leq 0$

13) The position of point (5, 8) with respect to the line 2x − 3y + 6 = 0 is

a) Above	b) Below	c) One the line	d) None

14) The location of the poin P (x, y) for which x < 0 and y > 0 is

a) 1st quadrant	b) 2nd quadrant	c) 3rd quadrant	d) 4th quadrant

15) Equation of horizontal lin passing through $(-5, 3)$ is

a) $x = -5$	b) $y = 3$	c) $3x - 5y = 0$	d) $5x + 3y = 0$

16) The slop of vertical line is

a) 1	b) zero	c) undefined	d) -1

17) The point of intersection of the lines $x - 2y + 1 = 0$ and $2x - y + 2 = 0$ is

a) $(1, 0)$	b) $(-1, 1)$	c) $(-1, 0)$	d) $(0, -1)$

18) Angle bisectors of a triangle are

a) parallel	b) Collinear	c) Perpendicular	d) Concurrent

19) Inclination of a line passing through $(0, 2)$ and $(0, 4)$ is

a) 30^o	b) 60^o	c) 45^o	d) 90^o

20) Equation of the line passing through $(-8, 5)$ having slope undefined is

a) $8y + 5x = 0$	b) $x = -8$	c) $y = 5$	d) $8x = 5y = 12$

Subjective Type

2 Answer the following short questions (2 x 25 = 50)

i) Describe the location in the plane of the point P(x, y) for which $x = 0$

ii) Describe the location in the plane of the point P(x, y) for which $x < 0$ and $y \geq 0$

iii) Describe the location in the plane of the point P(x, y) for which $x = y$

iv) Describe the location in the plane of the point P(x, y) for which $|x| = |y|$

v) Describe the location in the plane of the point P(x, y) for which $|x| \geq 3$

vi) Describe the location in the plane of the point P(x, y) for which $x > 2$ and $y = 2$

vii) Describe the location in the plane of the point P(x, y) for which x and y have opposite signs.

viii) Show that: the points A(3, 1), B(-2, -3) and C(2, 2) are vertices of an isosceles triangle.

x) The two points P and O' are given in xy-coordinate system. Find he XY-coordinates of P referred to the translated axes O'X and O'Y. P(-2, 6); O' (-3, 2)

ix) Find h such that A(-1, h), B(3, 2) and C(7, 3) are collinear.

xi) The xy-coordinate axes are translated through the point O' whose coordinate are given in xy-coordinate. The coordinate of P are given in the XY-coordinate system . Find the coordinates of P in xy- coordinate. P(-5, -3); O'(-2, -6)

xii) By means of slopes, show that the points lie on a line: (a, 2b); (c, a + b); (2c - a, 2a)

xiii) Find an equation of: The horizontal line through (7, -9)

xiv) Find an equation of: The vertical line through (-5, 3)

xv) Find an equation of: The line bisecting the first and third quadrants.

xvi) Find an equation of: The line bisecting the second and fourth quadrants.

xvii) Find an equation of the line. x - intercept: - 3 and y - intercept: 4

xviii) Find an equation of the line through (-4, -6) and perpendicular to a line having slope $\frac{-3}{2}$

xix) In the following check whether the two lines are.
(i) Parallel (ii) Perpendicular (iii) Neither parallel nor perpendicular. $2x + y - 3 = 0$; $4x + 2y + 5 = 0$

xx) The co-ordinates of a point P are (-6 , 9) . The axes are translated through the point O' (-3 , 2) . Find the co-ordinates of P referred to the new axes .

xxi) Transform the equation $5x - 12y + 39 = 0$ into
(1) Slope intercept form (2) Two - intercept form

xxii) Find the family of lines through the point of intersection of the line $3x - 4y - 10 = 0$ and $x + 2y - 10 = 0$ find the member of the family which is parallel to a line with slope $\frac{-2}{3}$

xxiii) Find the family of lines through the point of intersection of the line 3x - 4y - 10 = 0 and x + 2y - 10 = 0 find the member of the family which is Perpendicular to the line l : 3x - 4y + 1 = 0

xxiv) Find an equation of the line through (5 , -8) and perpendicular to the join of A (-15 , -8) , B (10 , 7) .

xxv) Find the interior angles of the triangle whose vertices are A (6 , 1) , B (2 , 7) , C (-6 , -7)

3 Answer the Following Long Questions (5 x 10 = 50)

i) Find the points trisecting join of A(-1, 4) and B(6, 2).

ii) The xy-coordinate axes are rotated about the origin through the indicated angle. The new axes are OX and OY. Find the XY-coordinates of the point P with the given xy-coordinates. P(5, 3) ; $\theta = 45^o$

iii) Find an equation of the perpendicular bisector joining the points A(3, 5) and B(9, 8) by two methods.

iv) Find an equation of the sides, altitudes and medians of the triangle whose vertices are A(-3, 2), B(5, 4) and C(3, -8).

v) The points A(-1, 2), B(6, 3) and C(2, -4) are vertices of a triangle. Show that the line joining the mid point D of AB and mid-point E of AC is parallel to BC and DE = $\frac{1}{2}$ BC.

vi) A milkman can sell litres of milk at Rs. 12.50 per litre and 700 litres of milk at Rs. 12.00 per litre. Assuming the graph of the sale price and the milk sold to be a straight line, find the number of litres of milk that the milkman can sell at Rs. 12.25 per litre.

vii) Find the distance between the parallel lines.
2x + y + 2 = 0 and 6x + 3y - 8 =0

viii) Convert the equation 15y - 8x + 3 = 0 into
(1) Slope intercept form (2) Two intercepts form (3) Normal form

ix) Find equations of two parallel lines perpendicular to 2x - y + 3 = 0 such that the product of the x- and y-intercepts of each is 3 .

x) Find the lines represented and also find measure of the angle between them . x^2 - 7xy sec α + y^2 = 0

BISMILLAH PAK FORCES COACHING & EDUCATIONAL ACADEMY

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Class: 2nd /Year - Mathematics Marks : 120 Exam Format : 786-Test Session 21-22 , Recite 3 times Darood o Salam Before Starting Test

Time : bismillahacademy223@gmail.com | Date _____ Examiner Sig _____ Chapter#: 5

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) ax + by $\leq$ c is a linear inequality in:

a) Three variables	b) Two variables	c) One variable	d) Four variables

2) The variables used in the system of linear inequalities relating to the problems of every day life are called:

a) Negative constraints	b) Negative coefficients	c) Non − negative constraints	d) Problem constraints

3) The solution region which can be enclosed by a circle is called:

a) convex region	b) Unbounded region	c) Circular region	d) Non−convex region

4) x = 5 is the solution of inequality:

a) 2x − 3 > 0	b) 2x + 3 < 0	c) x + 4 < 0	d) x + 2 < 0

5) The non − negative constraints are called:

a) Coefficients	b) Solutions	c) Decision variables	d) Vertex

6) ax + b = 0 is/an?

a) Equation	b) Inequality	c) Identity	d) linear equation

7) A point of solution region where two of its boundary lines intersect, is called:

a) Corner point	b) |Vertex	c) Both (a) and (b)	d) Stationary point

8) If the line segment obtained by joining any two points of the region lies entirely within the region, then the region is called:

a) Convex	b) Concave	c) Open half−plane	d) None

9) Region which is restricted to the first quadrant is called:

a) Half plane	b) Feasible region	c) Solution region	d) Closed plane

10) A vertical line divides the plane into two half planes:

a) Left and Right	b) Upper and lower	c) Both a and b	d) Open half plane

11) Each point of the feasible region is called a _____ of the system of linear inequalities:

a) Feasible solution	b) Solution set	c) Test point	d) Corner point

12) The maximum and minimum values of the objective function occur in the feasible region at:

a) Origin	b) Corner points	c) Any point	d) Both a and b

13) The solution region of the inequalities x > 0, y . 0 is:

a) 2nd quadrant	b) 3rd quadrant	c) 4th quadrant	d) 1st quadrant

14) The solution set of the inequality ax + by > c is:

a) Closed half plane	b) Circle	c) Open half plane	d) Parabola

15) The system of linear inequalities involved in the problem concerned are called:

a) Problem constraints	b) Solution	c) Coefficients	d) Half plane

16) A set consisting of all the feasible solutions of the system of linear inequality is called a:

a) Solution set	b) Feasible solution set	c) Closed half plane	d) Optimal solution set

17) Corner Points of 2x − 3y $\leq$ 6 and 2x + 3y $\leq$ 12 is:

a) $\left(\frac{9}{2},4\right)$	b) $\left(\frac{9}{2},1\right)$	c) $\left(\frac{2}{9},1\right)$	d) $\left(\frac{2}{9},0\right)$

18) Associated equation of ax + by < c and ax + by > c is:

a) ax + by = 0	b) ax + by = c	c) ax + by < c	d) ax + by + c = 0

19) a test point is the point which is _____ of the corresponding equation:

a) On the graph	b) Not on the graph	c) Below the graph	d) Above the graph

20) A function which is to be maximized is called:

a) Maximum function	b) Minimum function	c) Both a and b	d) Objective function

Subjective Type

2 Answer the following short questions (2 x 30 = 60)

i) Graph the solution set of the following linear inequality in xy plane. 3x + 7y ≥ 21

ii) Graph the solution set of the following linear inequality in xy plane.
2x + 1 ≥ 0

iii) Graph the solution set of the following linear inequality in xy plane.
5x - 4y ≤ 20

iv) Indicate the solution sets of the system of linear inequalities by shading.
3x + 7y ≥ 21
x - y ≤ 2

v) Indicate the solution sets of the system of linear inequalities by shading.
4x - 3y ≤ 12
$x \geq \frac{-3}{2}$

vi) Indicate the solution region of the systems of linear inequalities by shading.
x + y ≤ 5
-2x + y ≤ 2 ; x ≥ 0

vii) Indicate the solution region of the systems of linear inequalities by shading.
x + y ≥ 5
x - y ≥ 1 ; y ≥ 0

viii) Indicate the solution region of the systems of linear inequalities by shading.
3x + 7y ≤ 21
x - y ≤ 2 ; x ≥ 0

ix) Indicate the solution region of the systems of linear inequalities by shading.
3x + 7y ≤ 21
x - y ≤ 2 ; y ≥ 0

x) Graph the solution region of the system of linear inequalities and find the corner points in case.
2x - 3y ≤ 6
2x + 3y ≤ 12, x ≥ 0

xi) Graph the solution region of the system of linear inequalities and find the corner points in case.
x + y ≤ 5
-2x + y ≤ 2, y ≥ 0

xii) Graph the solution region of the system of linear inequalities and find the corner points in case.
3x + 2y ≥ 6
x + 3y ≤ 6; y ≥ 0

xiii) Graph the solution region of the system of linear inequalities and find the corner points in case.
5x + 7y ≤ 35
-x + 3y ≤ 3, x ≥ 0

xiv) Graph the solution region of the system of linear inequalities and find the corner points in case.
5x + 7y ≤ 35
x - 2y ≤ 2, x ≥ 0

xv) Graph the solution region of the system of linear inequalities by shading.
3x - 4y ≤ 12
3x + 2y ≥ 3
x + 2y ≤ 9

xvi) Graph the solution region of the system of linear inequalities by shading.
2x + y ≤ 4
2x - 3y ≥ 12
x + 2y ≤ 6

xvii) Graph the solution region of the system of linear inequalities by shading.
2x + y ≤ 10
x + y ≤ 7
-2x + y ≤ 4

xviii) Graph the solution region of the system of linear inequalities by shading.
2x + 3y ≤ 18
2x + y ≤ 10
-2x + y ≤ 2

xix) Graph the solution region of the system of linear inequalities by shading.
3x - 2y ≥ 3
x + 4y ≤ 12
3x + y ≤ 12

xx) Graph the feasible region of the system of linear inequalities and find the corner points in each case.
2x - 3y ≤ 6
2x + 3y ≤ 12
x ≥ 0, y ≥ 0

xxi) Graph the feasible region of the system of linear inequalities and find the corner points in each case.

$x + 5 \leq 5$

$-2x + y \geq 2$

$x \geq 0$

xxii) Graph the feasible region of the system of linear inequalities and find the corner points in each case.

$3x + 2y \geq 6$

$x + y \leq 4$

$x \geq 0, y \geq 0$

xxiii) Graph the feasible region of the systems of linear inequalities and find the corner points in each case.

$2x + y \leq 10$

$x + 4y \leq 12$

$x + 2y \leq 10, x \geq 0, y \geq 0$

xxiv) Graph the feasible region of the systems of linear inequalities and find the corner points in each case.

$2x + 3y \leq 18$

$2x + y \leq 10$

$x + 4y \leq 12, x \geq 0, y \geq 0$

xxv) Graph the feasible region of the systems of linear inequalities and find the corner points in each case.

$2x + 3y \leq 18$

$x + 4y \leq 12$

$3x + y \leq 12, x \geq 0, y \geq 0$

xxvi) Graph the feasible region of the systems of linear inequalities and find the corner points in each case.

$x + 3y \leq 15$

$2x + y \leq 12$

$4x + 3y \leq 24, x \geq 0, y \geq 0$

xxvii) Graph the feasible region of the systems of linear inequalities and find the corner points in each case.

$2x + y \leq 20$

$8x + 15y \leq 120$

$x + y \leq 11, x \geq 0, y \geq 0$

xxviii) Graph the feasible region subject to the following constraints .

$2x - 3y \leq 6$

$2x + y \geq 2$

$x \geq 0$, $y \geq 2$

xxix) Graph the feasible region subject to the following constraints .

$2x - 3y \leq 6$

$2x + y \geq 2$

$x + 2y \geq 8$

$x \geq 0$, $y \geq 2$

xxx) Graph the solution region for the following system of inequalities .

$x - 2y \leq 6$; $2x + y \geq 2$; $x + 2y \leq 10$

3 Answer the Following Long Questions (5 x 8 = 40)

i) Maximize $f(x, y) = x + 3y$ subject to the constraints $2x + 5y \leq 30, 5x + 4y \leq 20; x \geq 0; y \geq 0$

ii) Minimize $z = 2x + y$ subject to the constrains $x + y \geq 3$; $7x + 5y \leq 35$; $x \geq 0$; $x \geq 0$; $y \geq 0$

iii) Each unit of food X costs Rs. 25 and contains 2 units of protein and 4 units of iron while each unit of food Y costs Rs. 30 and contains 3 units of protein and 2 unit of iron. Each animal must receive at least 12 units of protein and 16 units of iron each day. How many units of each food should be fed to each animal at the smallest possible cost?

iv) A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5760 to invest and has space at most for 20 items. A fan costs him Rs. 360 and a sewing machines costs Rs. 240. His expectation is that he can sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit?

v) A machine can product A by using 2 units of chemical and 1 unit of a compound or can produce product B by using 1 unit of chemical and 2 units of the compound. Only 800 units of chemical and 1000 units of the compound. Only 800 units of chemical and 1000 units of the compound are available. The profits per unit of A and B are Rs. 30 and Rs. 20 respectively, maximize the profit function.

vi) Maximize $z = 2x + 3y$ subject to the constraints $3x + 4y \leq 12, 2x + y \leq 4; 2x - y \leq 4$; $x \geq 0; y \geq 0$

vii) Maximize $z = 3x + y$ subject to the constraints $3x + 5y \geq 15$, $x + 6y \geq 9$; $x \geq 0$; $y \geq 0$

viii) A farmer possesses 100 kanals of land and wants to grow corn and wheat . Cultivation of corn requires 3 hours per kanal while cultivation of wheat requires 2 hours per kanal . Working hours cannot exceed 240 . If he gets a profit of Rs . 20 per kanal for corn and Rs. 15/ - per kanal of wheat , how many kanals of each he should cultivate to maximize his profit ?

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Chapter#: 6

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1) The length of Latus rectum of the parabola $y^2 = 8x$ is

a) 2	b) 4	c) 8	d) $2\sqrt{2}$

2) Equation of normal to hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the point (x_1, y_1) is

a) $\frac{a^2x}{x_1} - \frac{b^2y}{y_1} = a^2 - b^2$	b) $\frac{a^2x}{x_1} + \frac{b^2y}{y_1} = a^2 + b^2$	c) $\frac{a^2x}{x_1} - \frac{b^2y}{y_1} = a^2 + b^2$	d) $\frac{a^2x}{x_1} + \frac{b^2y}{y_1} = a^2 - b^2$

3) The distance between centre and any focus of the ellipse is denoted by c and is given as

a) $c = \sqrt{a^2 - b^2}$	b) $c = \sqrt{a^2 + b^2}$	c) $c = \sqrt{b^2 - a^2}$	d) $c^2 = a^2 + b^2$

4) An equation of the normal to the circle $x^2 + y^2 = 25$ at $(4, 3)$ is

a) $3x - 4y = 0$	b) $4x - 3y = 0$	c) $4x + 3y = 0$	d) $3x + 4y = 0$

5) Length of latus - rectum of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

a) $\frac{2b^2}{a}$	b) $\frac{2b}{a^2}$	c) $\frac{a}{2b^2}$	d) $2a^2$

6) If foci are $(2 \pm 5\sqrt{2}, -7)$ and length of the transverse axis 10, so then equation of hyperbola is

a) $\frac{y^2}{36} - \frac{x^2}{45} = 1$	b) $\frac{(x-2)^2}{9} - \frac{(y-2)^2}{27} = 1$	c) $\frac{(y-1)^2}{5} - \frac{(x-5)^2}{4} = 1$	d) $\frac{(x-2)^2}{25} - \frac{(y+7)^2}{25} = 1$

7) A line that touches the curve at on point is called

a) Secant	b) Radius	c) Directrix	d) Tangent

8) In conic the number e is called

a) Focus	b) vertex	c) Eccentricity	d) Axes

9) The graph of the parabola $x^2 = 4ay$

a) Opens up	b) Opens down	c) Opens right	d) Open left

10) The line $y = mx + c$ intersects the circle $x^2 + y^2 = a^2$ in at most

a) Two points	b) Three points	c) One point	d) Four points

11) An equation of ellipse with centre $(0, 0)$ focus $(0, -3)$ and vertex $(0, 4)$ is

a) $\frac{x^2}{16} + \frac{y^2}{1} = 1$	b) $\frac{x^2}{7} + \frac{y^2}{16} = 1$	c) $\frac{x^2}{16} + \frac{y^2}{25} = 1$	d) $\frac{x^2}{16} + \frac{y^2}{7} = 1$

12) Directrices of hyperbola $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$ are

a) $y = \pm\frac{c}{e^2}$	b) $y = 0$	c) $x = \pm\frac{c}{e^2}$	d) $x = 0$

13) Vertex of the parabola $y^2 = 4x + 4y$ is at

a) $(-1, 2)$	b) $(1, 2)$	c) $(1, -2)$	d) $(-1, -2)$

14) The two separate parts of hyperbola are called its

a) Vertices	b) Braches	c) Foci	d) Directrices

15) An equation of circle passing through $A(3, -1)$, $B(0, 1)$ and having centre at $4x - 3y - 3 = 0$ is

a) $x^2 + y^2 - 15x - 18y + 17 = 0$	b) $x^2 + y^2 + 15x + 18y + 17 = 0$	c) $x^2 + y^2 + 15x - 18y - 17 = 0$	d) None

16) General form of an equation of a circle is

a) $x^2 + y^2 + 2gx + 2fy + c = 0$	b) $x^2 + y^2 - 2gx - 2fy + c = 0$	c) $x^2 + y^2 + 2gx + 2fy - c = 0$	d) $x^2 + y^2 + 2gx + 2fy = 0$

17) Eccentricity of the ellipse is

a) $e = \frac{a}{c}$	b) $e = \frac{c^2}{a^2}$	c) $e = \frac{a^2}{c^2}$	d) $e = \frac{c}{a}$

18) The equation $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$ represents a circle if

a) $a \neq b, h \neq 0$	b) $a \neq b, h = 0$	c) $a = b, h \neq 0$	d) $a = b, h = 0$

19) The value of a for which a parabola $y^2 = 4ax$ passes through the point $(2, 3)$ is

a) $\frac{9}{8}$	b) $\frac{8}{9}$	c) $\frac{1}{3}$	d) $\frac{-1}{3}$

20) The parabola $x^2 = 4ay$, $a < 0$ opens

a) Right side	b) Upward	c) Downward	d) Left side

Subjective Type

2 Answer the following short questions (2 x 25 = 50)

i) Find an equation of the circle with: Centre at (5, -2) and radius 4.

ii) Find an equation of the circle with: Centre at $(\sqrt{2}, -3\sqrt{3})$ and radius $2\sqrt{2}$

iii) Find an equation of the circle with: Ends of a diameter at (-3, 2) and (5, -6).

iv) Find the centre and radius of the circle with the given equation $x^2 + y^2 + 12x - 10y = 0$

v) Find the centre and radius of the circle with the given equation $5x^2 + 5y^2 + 14x + 12y - 10 = 0$

vi) Check the position of the point (5, 6) with respect to circle $2x^2 + 2y^2 + 12x - 8y + 1 = 0$

vii) Find the coordinates of the points of intersection of the line $x + 2y = 6$ with the circle $x^2 + y^2 - 2x - 2y - 39 = 0$

viii) Discuss and sketch the graph of the parabola $y^2 = 8x$

ix) Discuss and sketch the graph of the parabola $y^2 = -12x$

x) Discuss and sketch the graph of the parabola $x^2 - 4x - 8y + 4 = 0$

xi) Write an equation for the parabola with given elements, Focus (-3, 1); directrix x = 3

xii) Write an equation for the parabola with given elements, Focus (2, 5); directrix y = 1

xiii) Write an equation for the parabola with given elements, Focus (-3, 1); directrix x - 2y - 3 = 0

xiv) Write an equation for the parabola with given elements, Focus (1, 2), vertex (3, 2)

xv) Write an equation for the parabola with given elements, Directrix x = -2, focus (2, 2)

xvi) Write an equation for the parabola with given elements, Directrix y = 3 and vertex (2, 2)

xvii) Find the centre, foci, eccentricity and vertices an directrices of the ellipse whose equation is given. $9x^2 + y^2 = 18$

xviii) The major axis of an ellipse in standard from lies along the x-axis and has length $4\sqrt{2}$. The distance between the foci equals the length of the minor axis. Write an equation of the ellipse.

xix) An astroid has an elliptic orbit with the sun at one focus. Its distance from the sun ranges from 17 million to 183 million miles. Write an equation of the orbit of the astroid.

xx) Find the centre, foci eccentricity vertices and equations of directrices. $9x^2 - 12x - y^2 - 2y + 2 = 0$

xxi) Two listening posts hear the sound of an enemy gun. The difference in time is one second. If the listening posts are 1400 feet apart, write an equation of the hyperbola passing through the position of the enemy gun. (Sound travels at 1080 ft/sec).

xxii) Find the equation of the tangents to each of through the given points. $x^2 + y^2 = 25$ through (7, -1)

xxiii) Find the equation of w.r.t to new parallel axes obtained by shifting the origin to the indicated point. $9x^2 + 4y^2 + 18x - 16y - 11 = 0$ O' (-2 , 4)

xxiv) Discuss and sketch the graph of the parabola $x^2 = 4 (y - 1)$

xxv) Analyze the conic xy = 4 and write its elements ?

3 Answer the Following Long Questions (5 x 10 = 50)

i) Find an equation of the circle passing through. A(3, -1), B(0, 1) and having centre on 4x - 3y - 3 = 0

ii) Find an equation of the circle passing through. A(5, 1) and tangent to the line 2x - y - 10 = 0 at B(3, -4)

iii) Show that the circles $x^2 + y^2 + 2x - 8 = 0$ and $x^2 + y^2 + - 6x + 6y - 46 = 0$ touch internally.

iv) Find an equation of the chord of contact of the tangents drawn from (4, 5) to the circle $2x^2 + 2y^2 - 8x + 12y + 21 = 0$

v) Prove that the mid point of the hypotenuse of a right angled triangle is the circum centre of the triangle.

vi) Find the centre, foci, eccentricity and vertices an directrices of the ellipse whose equation is given. $25x^2 + y^2 - 250x - 16y + 541 = 0$

vii) Find the measure of angle through which the axes be rotated so that the product term XY is removed from the transformed equation. Also find the transformed equation.
xy + 4x - 3y - 10 = 0

viii) By rotation of axes, eliminate the xy-terms in the following equation. Identity the conic and find its elements. $x^2 - 4xy - 2y^2 + 10x + 4y = 0$

ix) Show that an equation of the parabola with focus at ($\alpha \cos \alpha$, $\alpha \sin \alpha$) and directrix $x \cos \alpha + y \sin \alpha + \alpha = 0$

x) Find an equation of $5x^2 - 6xy + 5y^2 - 8 = 0$ with respect to new axes obtained by rotation of axes about the origin through an angle of 135^0 .

BISMILLAH PAK FORCES COACHING & EDUCATIONAL ACADEMY

Student Name _____ Father Name _____ Roll Number _____

Class: 2nd /Year - Mathematics Marks : 120 Exam Format : 786-Test Session 21-22 , Recite 3 times Darood o Salam Before Starting Test

Time : bismillahacademy223@gmail.com | Date _____ Examiner Sig _____

Chapter#: 7

MCQ's		S/Q		L/Q		Total	

Objective Type

1. Encircle the Correct Option. (1 x 20 = 20)

1. درست جواب کے گرد دائرہ لگائیں۔

1) If $\underline{a}$ and $\underline{b}$ are two non − zero vectors, then a vector perpendicular to each of the vectors is

a) $\underline{a} \times \underline{b}$	b) $\lvert\underline{b} \times \underline{a}\rvert$	c) $\underline{a}.\underline{b}$	d) $\underline{b}.\underline{a}$

2) If $\underline{u}, \underline{v}$ and $\underline{w}$ are conterminous edges of a tetrahedron, then its volume

a) $\frac{1}{3}[a.(b \times c)]$	b) $\frac{1}{6}[a.(b \times c)]$	c) $\frac{1}{2}[a.(b \times c)]$	d) $\frac{1}{4}[a.(b \times c)]$

3) $\hat{k} \times \hat{j} =$

a) $\hat{i}$	b) $-\hat{i}$	c) zero	d) 1

4) Which of the following quantity is vector

a) Momentum	b) length	c) Speed	d) Volume

5) Work done of a force on a particle is

a) Scalar quantity	b) Vector quantity	c) Zero	d) None

6) If α, β, γ direction angles of a vector then $\cos\alpha, \cos\beta, \cos\gamma$ are called

a) Direction angles	b) Direction components	c) Direction cosines	d) Direction vector

7) The value of [k i j] is

a) zero	b) −1	c) 1	d) 2

8) The line segments formed by joining the mid points of the sides of a quadrilateral taken in order form

a) Trapezium	b) Cube	c) Parallelogram	d) Square

9) Volume and speed are examples of

a) Vector quantity	b) Scalar quantity	c) Constant	d) None

10) length of the vector $2\hat{i} + \hat{j} - 2\hat{k}$ is

a) 4	b) 3	c) 2	d) 5

11) The dot product is also reffered as

a) Scalar product	b) Inner product	c) Vector product	d) Both a and b

12) Unit vector $\hat{u}$ is defined as

a) $\underline{u}\lvert\underline{u}\rvert$	b) $\underline{u} + \lvert\underline{u}\rvert$	c) $\frac{\underline{u}}{\lvert\underline{u}\rvert}$	d) $\underline{u} - \lvert\underline{u}\rvert$

13) The unit vector along y − axis is

a) $\hat{k}$	b) $\hat{i}$	c) $\hat{j}$	d) None

14) If $\underline{a}$ and $\underline{b}$ represents the two adjacent sides of a triangle, then area of triangle is

a) $\underline{a}.\underline{b}$	b) $\lvert\underline{b} \times \underline{a}\rvert$	c) $\lvert\underline{a} \times \underline{b}\rvert$	d) $\frac{\lvert\underline{a} \times \underline{b}\rvert}{2}$

15) $\underline{u}.\underline{u}$ = ?

a) $\|\underline{u}\|^2$	b) $\|\underline{u}\|$	c) Zero	d) 1

16) The value of $[2\underline{i}\ \ 3\underline{j}\ \ 4\underline{k}]$ is

a) −9	b) 24	c) 9	d) −24

17) If any two non−zero vector are equal in scalar triple product, then its value is

a) zero	b) 10	c) 2	d) 1

18) Angle between non zero vectors $\underline{u}$ & $\underline{v}$ is 0 or π then these vectors are

a) Parallel	b) Collinear	c) Both 'a' and 'b'	d) None of these

19) Parallelogram law of addition of vectors was used by

a) Newton	b) Aristotle	c) Leibniz	d) Lagrange

20) The magnitude of the position vector of any point P(x, y) is

a) $\sqrt{x^2-y^2}$	b) $\sqrt{x^2+y^2}$	c) $\sqrt{x^2y^2}$	d) x^2+y^2

Subjective Type

2 Answer the following short questions (2 x 25 = 50)

2 مندرجہ ذیل سوالات کے مختصر جوابات تحریر کریں۔

i) Write the vector $\overrightarrow{PQ}$ in the form $x\underline{i} + y\underline{j}$ P = (2, 3), Q(6, -2)

ii) Find the magnitude of the vector u $\underline{u} = \underline{i} + \underline{j}$

iii) Find the vector from A to the origin where $\overrightarrow{AB} = 4\underline{i} - 2\underline{j}$ and B is the point (-2, 5)

iv) If A, B and C are respectively the point (2, -4), (4, 0) and (1, 6) use vector method to find the coordinates of the point D if: ADBC is a parallelogram

v) If $\overrightarrow{AB} = \overrightarrow{CD}$. Find the coordinates of the point A when points B, C, D are (1, 2), (-2, 5), (4, 11) respectively.

vi) Let A = (2, 5), B = (-1, 1) and C = (2, -6). Find $2\overrightarrow{AB} - \overrightarrow{CB}$

vii) Let $\underline{u} = \underline{i} + 2\underline{j} - \underline{k}, \underline{v} = 3\underline{i} - 2\underline{j} + 2\underline{k}$, $\underline{w} = 5\underline{i} - \underline{j} + 3\underline{k}$. Find the indicated vector or number. $\underline{u} + 2\underline{v} + \underline{w}$

viii) Let $\underline{u} = \underline{i} + 2\underline{j} - \underline{k}, \underline{v} = 3\underline{i} - 2\underline{j} + 2\underline{k}$, $\underline{w} = 5\underline{i} - \underline{j} + 3\underline{k}$. Find the indicated vector or number. $\underline{v} - 3\underline{w}$

ix) Find vector whose: magnitude is 4 and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$

x) If $\underline{u} = 2\underline{i} + 3\underline{j} + 4\underline{k}$ $\underline{v} = -\underline{i} + 3\underline{j} - \underline{k}$ and $\underline{w} = \underline{i} + 6\underline{j} + z\underline{k}$ represents the sides of triangle. Find value of, z.

xi) The position vectors of the points A, B, C, D are $2\underline{i} - \underline{j} + \underline{k}$ $3\underline{i} + \underline{j}$, $2\underline{i} + 4\underline{j} - 2\underline{k}$ and $-\underline{j} - 2\underline{j} + \underline{k}$ respectively $\overrightarrow{AB}$ is parallel to $\overrightarrow{CD}$.

xii) Find the direction cosines of the given vectors. $\overrightarrow{PQ}$ where P((2, 1, 5) and Q(1, 3, 1)

xiii) Which of the triples can be the direction angles of a single vector. 30^o, 45^o, 60^o

xiv) Which of the triples can be the direction angles of a single vector. 45^o, 60^o, 60^o

xv) Calculate the projection of a along b and protection of b along a when $\underline{a} = 3\underline{i} + \underline{j} - \underline{k}$ $\underline{b} = -2\underline{i} - \underline{j} + \underline{k}$

xvi) Which vectors if any, are perpendicular or parallel. $\underline{u} = 5\underline{i} - \underline{j} + \underline{k}; \underline{v} = \underline{j} - 5\underline{k}; \underline{w} = -15\underline{i} + 3\underline{j} - 3\underline{k}$

xvii) Prove that: $\underline{a} \times (\underline{b} \times \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$

xviii) Prove that $\sin(\alpha - \beta) = \alpha \cos\beta - \cos\alpha \sin\beta$

xix) Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k}, -2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are coplanar.

xx) Find volume of the tetrahedron with the vertices (2, 1, 8), (3, 2, 9), (2, 1, 4) and (3, 3, 10)

xxi) A force $F = 3\underline{i} + 2\underline{j} - 4\underline{k}$ is applied at the point (1, -1, 2). Find the moment of force about the point (2, -1, 3)

xxii) Write the vector $\overrightarrow{PQ}$ in the form $x\underline{i} + y\underline{j}$ P = (0, 5), Q(-1, -6)

xxiii) Which vectors , if any , are perpendicular or parallel .

$\underline{u} = \underline{i} + 2\underline{j} - \underline{k}$, $\underline{v} = -\underline{i} + \underline{j} + \underline{k}$, k

$\underline{w} = -\frac{2}{\pi}\underline{i} - \pi\underline{j} + \frac{\pi}{2}\underline{k}$

xxiv) Find the volume of parallelepiped for which the given vectors are three edges. $\underline{u} = \underline{i} - 2\underline{j} + 3\underline{k}$,

$\underline{v} = 2\underline{i} - \underline{j} - \underline{k}$,$\underline{w} = \underline{j} + \underline{k}$

xxv) Find the constant α such that the vectors are coplanar .

$\underline{i} - \underline{j} + \underline{k}$, $\underline{i} - 2\underline{j} - 3\underline{k}$ and $3\underline{i} - \alpha\underline{j} + 5\underline{k}$

3 Answer the Following Long Questions (5 x 10 = 50)

3 درج ذیل سوالات کے تفصیلاً جوابات دیں۔

i) If B, C and D are respectively (4, 1), (-2, 3) and (-8, 0) use vector method of find the coordinates of the point. A if ABCD is a parallelogram

ii) Find the position vectors of the point of division of the line segments joining the following pair of points in the given ratio. Point C with positive vector $2\underline{i} - 3\underline{j}$ and point D with position vector $3\underline{i} + 2\underline{j}$ in the ratio 4 : 3.

iii) Show that: the vectors $3\underline{i} - 2\underline{j} + \underline{k}$ $\underline{i} - 3\underline{j} + 5\underline{k}$ and $2\underline{i} + \underline{j} - 4\underline{k}$ from a right angle triangle

iv) Prove that perpendicular bisectors of the sides of a triangle are concurrent.

v) Prove that in any triangle ABC $c^2 = a^2 + b^2 - 2ab \cos C$

vi) Find the volume of parallelepiped for which the given vectors are three edges. $\underline{u} = 3\underline{i} + 2\underline{k}$; $\underline{v} = \underline{i} + 2\underline{j} + \underline{k}$; $\underline{w} = -\underline{j} + 4\underline{k}$

vii) Verify that $\underline{a}.\underline{b} \times \underline{c} = \underline{b}.\underline{c} \times \underline{a} = \underline{c}.\underline{a} \times \underline{b}$ $\underline{a} = 3\underline{i} - \underline{j} + 5\underline{k}$ if $\underline{b} = 4\underline{i} + 3\underline{j} - 2\underline{k}, \underline{c} = 2\underline{i} + 5\underline{j} + \underline{k}$

viii) A particle is displaced from the point A(5, -5, -7) to the point B(6, 2, -2) under the action of constant forces defined by $10\underline{i} - 6\underline{j} + 11\underline{k}, 4\underline{j} + 5\underline{j} + 9\underline{k}$ and $-2\underline{i} + \underline{j} - 9\underline{k}$. Show that the total work done by the forces is 67 units.

ix) Prove that in any triangle ACB $a^2 = b^2 + c^2 - 2bc \cos A$ (Cosine Law)

x) Prove that in any triangle ACB $a = b \cos C + c \cos B$ (Projection Law)